

FEATURE ARTICLES

**REPRODUCTIVE EFFORT AND RETURN RATES IN THE MOUNTAIN  
WHITE-CROWNED SPARROW**

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*Abstract.* We analyzed return rates of high-altitude-breeding Mountain White-crowned Sparrows (*Zonotrichia leucophrys oriantha*) in relation to five components of their previous season's reproductive effort: number of fledglings produced, double brooding, number of nesting attempts (first nests plus renests), total number of eggs laid, and fledging date. No relationship of return rate to reproductive effort occurred except in the case of fledging date. Fledging dates spanned a 2-month period from mid-June to mid-August. Returns of females to the study area held steady no matter when their chicks fledged in the previous breeding season, but male return rates increased significantly when their chicks fledged after 20 July. Coincident with that time frame, they entered molt and often withdrew parental care. We hypothesized that males in this montane environment, where thermoregulatory costs are high, traded off reproductive effort (parental care) with survival (return rates). This fits well with models of life-history evolution; however, the corresponding prediction that return rates of females with late-season broods should decrease due to their assumption of greater parental care was not supported. Apparently, the cost of reproduction shifted to the young: late-season nestlings grew more slowly, fledged at a smaller mass, and exhibited a fourfold increase in brood reductions. Their recruitment as breeders in the following season was also greatly reduced. Thus, a cost of reproduction was expressed in two forms, one as changes in survival rates of breeding males, the other as changes in quality of offspring.

*Key words.* cost of reproduction, Mountain White-crowned Sparrow, reproductive effort, trade-offs, *Zonotrichia leucophrys oriantha*.